29. A method for producing a semiconductor device comprising:

forming a first conductive layer;

forming an insulating layer over said first conductive layer;

forming an opening in said insulating layer to expose said first conductive layer at a bottom of said opening;

filling said opening with a second conductive layer comprising a conductive oxide to cover said insulating layer and said opening;

forming a reflective electrode on the insulating layer, wherein said reflective pixel electrode is electrically connected to the first conductive layer through the second conductive layer.--

REMARKS

At the outset, the Examiner is thanked for the thorough review and consideration of the present application.

The Examiner's non-final Office Action dated October 11, 2001 has been received and its contents carefully noted. Claims 1-26 were pending in the present application. By this amendment, claims 1-5, 14, 15, 18, and 20-26 have been amended, claims 13, 16, 17 and 19 have been canceled without prejudice or disclaimer, and new claims 27-29 have been added. Accordingly, claims 1-12, 14, 15, 18 and 20-29 are now pending, of which claims 1-4, 14, 15, 28 and 29 are independent.

Claim Objections

The objections to claims 13 and 19 are moot in view of the cancellation of those claims.

Claim Rejections - 35 U.S.C. § 112

Claims 20-26 have been amended such that they are dependent in the alternative rather than the conjunctive. Although this Amendment is made in response to a rejection under § 112, the Amendment is merely clarifying in nature, and should not in any way affect the scope of protection afforded the claims for infringement purposes, particularly, under the Doctrine of Equivalents.

Claim Rejections - 35 U.S.C. § 102

Claims 1 and 3 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Jun, U.S. Patent No. 5,948,705 (Jun '705). Applicants have amended the claims to overcome this rejection.

Regarding amended claim 1, the present invention resides in that both the insulating layer and the embedded conductive layer comprise an organic resin. As discussed in paragraphs 5 and 6 of page 11 of the specification, when the embedded conductive layer is etched back, it is relatively easy to achieve a leveled upper surface because of the similar etching selectivity of the materials.

Regarding amended claim 3, the present invention resides in that a transparent electrode is electrically connected to a semiconductor layer of a transistor through an embedded conductive layer comprising carbon material. As discussed in Example 10, when connecting a transparent electrode directly to a semiconductor layer of a thin film transistor, there arises a problem of leakage of light from the contact part, by which reliability of the thin film transistor is decreased. The claimed invention solves this problem since leakage light can be blocked by the embedded conductive layer.

All of the elements of the claims are not disclosed by the prior art, either explicitly or inherently; therefore, the prior art does not anticipate claims 1 and 3, and the rejection under § 102(e) should be withdrawn.

Claim Rejections - 35 U.S.C. § 103

Claims 2, 4-6, and 13 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Jun in view of Kobayashi et al., U.S. Patent No. 6,221,140 (Kobayashi). The examiner is contending that it would have been obvious to form an oxide conductive layer by spin coating for the conductive layer 46 of Jun '705 in view of Kobayashi. However, although Kobayashi teaches to form an oxide conductive layer by spin coating, there is no suggestion in Kobayashi to form an oxide conductive layer as the plug 37 of Jun '705. The inventors of the present invention discovered that it is advantageous to form a layer for the plug by spin coating since the thickness of the layer should be equal to or larger than the thickness of the underlying insulating

film (see the first full paragraph of page 12). There is no suggestion or motivation to combine the teaching of Kobayashi with Jun '705 to achieve the claimed method. For the reasons stated above, the Examiner has failed to set forth *prima facie* case of obviousness; therefore, the Applicants respectfully request that the Examiner withdraw the § 103 rejection.

Claims 7-12 and 19-26 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Jun '705 and Kobayashi as applied to claims 2, 5, 6 and 13 above, and further in view of Fukunaga et al., U.S. Patent No. 5,706,064 (Fukunaga). Please incorporate the arguments above with respect to the deficiencies in Jun '705 and Kobayashi. Fukunaga does not correct the deficiencies in Jun '705 and Kobayashi. Fukunaga is relied upon for the teaching of forming an embedded conductive layer 411b made of inorganic oxide conductive layer of ITO or ZnO or made of organic conductive layer of carbon or polymer. For the reasons stated above, the Examiner has failed to set forth *prima facie* case of obviousness; therefore, the Applicants respectfully request that the Examiner withdraw the § 103 rejection.

Claim 14 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Jun '705 in view of Jun, U.S. Patent No. 6,043,149 (Jun '149). Jun '149 is relied upon by the examiner for showing the CMP process. Claim 14 has been amended to recite a second conductive layer comprising a conductive oxide and wherein said third conductive layer is reflective. The prior art does not disclose this feature of the claim, either explicitly or inherently. In light of the above amendment, the Applicants respectfully request that the Examiner withdraw the § 103 rejection.

Claims 16-18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Jun '703 and Jun '149 as applied to claim 14 above, and further in view of Fukunaga. Please incorporate the arguments above with respect to the deficiencies in Jun '703 and Jun '149. Fukunaga does not correct the deficiencies in the above cited references; therefore, the Applicants respectfully request that the Examiner withdraw the § 103 rejection.

Claim 15 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Jun '705 in view of Fukunaga and Jun '149. Claim 15 has been amended to recite forming an active layer of a transistor, forming an opening in said insulating layer to expose a portion of the active layer at a bottom of said opening, forming a black colored conductive layer to cover said insulating layer

and said opening, and polishing said black colored conductive layer. The prior art does not disclose this feature of the claim, either explicitly or inherently. Therefore, the Applicants respectfully request that the Examiner withdraw the § 103 rejection.

New Claims 27-29

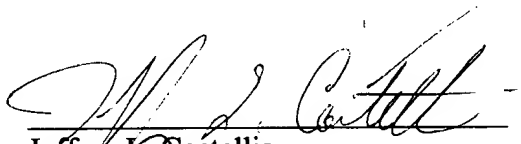
New dependent claim 27 is dependent on independent claim 1, and for the reasons stated above, is patentable over the prior art.

New independent claim 28 is substantially similar to claim 1 except that the etching or polishing step of claim 1 is replaced with a removing step. New independent claim 29 further recites the novel features of the present invention. It is respectfully submitted that claims 28 and 29 are not anticipated by or rendered obvious by the prior art. Examination on the merits is respectfully requested.

Conclusion

Having responded to all rejections set forth in the outstanding non-final Office Action, it is submitted that the claims are now in condition for allowance. An early and favorable Notice of Allowance is respectfully solicited. In the event that the Examiner is of the opinion that a brief telephone or personal interview will facilitate allowance of one or more of the above claims, the Examiner is courteously requested to contact Applicants' undersigned representative.

Respectfully submitted,



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MARKED-UP VERSION
OF THE AMENDED CLAIMS

1. (Amended) A method for producing a semiconductor device comprising:

[a step of] forming a first conductive layer;

[a step of] forming an insulating layer comprising an organic resin over said first conductive layer;

[a step of] forming an opening in said insulating layer to expose said first conductive layer at a bottom of said opening;

[a step of] forming an embedded conductive layer comprising an organic resin to cover said insulating layer and said opening;

[a step of] etching or polishing said embedded conductive layer to [make a state in that only said opening is filled with said embedded conductive layer] expose a portion of the insulating layer; and

[a step of] forming a second conductive layer on said insulating layer and said embedded conductive layer.

2. (Amended) A method for producing a semiconductor device comprising:

[a step of] forming a first conductive layer;

[a step of] forming an insulating layer over said first conductive layer;

[a step of] forming an opening in said insulating layer to expose said first conductive layer at a bottom of said opening;

[a step of] forming an oxide conductive layer by a spin coating method to cover said insulating layer and said opening;

[a step of] etching or polishing said oxide conductive layer to make a state in that only said opening is filled with said oxide conductive layer; and

[a step of] forming a second conductive layer on said insulating layer and said oxide conductive layer.

3. (Amended) A method for producing a semiconductor device comprising:

[a step of forming a first conductive layer;]

forming an active layer of a transistor;

[a step of] forming an insulating layer over said [first conductive] active layer;

[a step of] forming an opening in said insulating layer to expose [said first conductive] a portion of the active layer at a bottom of said opening;

[a step of] forming an embedded conductive layer comprising a black colored material to cover said insulating layer and said opening wherein the embedded conductive layer contacts the active layer in the opening;

[a step of] forming a [second] transparent conductive layer on said embedded conductive layer;

[a step of] patterning said [second] transparent conductive layer to [a desired pattern] form a transparent pixel electrode[; and]

[a step of etching said embedded conductive layer by using said second conductive layer as a mask in a self alignment manner].

4. (Amended) A method for producing a semiconductor device comprising:

[a step of] forming a first conductive layer;

[a step of] forming an insulating layer over said first conductive layer;

[a step of] forming an opening in said insulating layer to expose said first conductive layer at a bottom of said opening;

[a step of] forming an oxide conductive layer by a spin coating method, to cover said insulating layer and said opening;

[a step of] forming a second conductive layer on said oxide conductive layer;

[a step of] patterning said second conductive layer to a desired pattern, and

[a step of] etching said oxide conductive layer by using said second conductive layer as a mask in a self alignment manner.

5. (Amended) A method for producing a semiconductor device according to claim 1, wherein said embedded conductive layer comprises an organic resin film containing a conductive material dispersed therein [or an inorganic film containing a conductive material dispersed therein].

14. (Amended) A method for producing a semiconductor device comprising:

[a step of] forming a first conductive layer;

[a step of] forming an insulating layer over said first conductive layer;

[a step of] forming an opening in said insulating layer to expose said first conductive layer at a bottom of said opening;

[a step of] forming a second conductive layer comprising a conductive oxide to cover said insulating layer and said opening;

[a step of] polishing said second conductive layer by employing a chemical mechanical polishing; and

[a step of] forming a third conductive layer on said insulating layer and said second conductive layer,

wherein said third conductive layer is reflective.

15. (Amended) A method for producing a semiconductor device comprising:

[a step of forming a first conductive layer;]

forming an active layer of a transistor;

[a step of] forming an insulating layer over [said first conductive] the active layer;

[a step of] forming an opening in said insulating layer to expose [said first conductive] a portion of the active layer at a bottom of said opening;

[a step of] forming [an oxide] a black colored conductive layer to cover said insulating layer and said opening;

[a step of] polishing said [oxide] black colored conductive layer by employing a chemical mechanical polishing; and

[a step of] forming a second conductive layer on said insulating layer and said oxide conductive layer, wherein said second conductive layer is transparent.

18. (Amended) A method for producing a semiconductor device according to claim 14, wherein said [conductive material is selected from the group consisting of zinc oxide, aluminum flakes and nickel flakes] conductive oxide comprises a metal oxide.

20. (Amended) A method for producing a semiconductor device according to claim 1, 2, 3, 4, 14 [and] or 15, wherein said semiconductor device is [applied to a display device of] a cellular phone.

21. (Amended) A method for producing a semiconductor device according to claim 1, 2, 3, 4, 14 [and] or 15, wherein said semiconductor device is [applied to a display device of] a camcorder.

22. (Amended) A method for producing a semiconductor device according to claim 1, 2, 3, 4, 14 [and] or 15, wherein said semiconductor device is [applied to a display device of] a portable computer.

23. (Amended) A method for producing a semiconductor device according to claim 1, 2, 3, 4, 14 [and] or 15, wherein said semiconductor device is [applied to a display device of] a head mounting display.

24. (Amended) A method for producing a semiconductor device according to claim 1, 2, 3, 4, 14 [and] or 15, wherein said semiconductor device is [applied to a display device of] a rear type projector.

25. (Amended) A method for producing a semiconductor device according to claim 1, 2, 3, 4, 14 [and] or 15, wherein said semiconductor device is [applied to a display device of] a front type projector.

26. (Amended) A method for producing a semiconductor device according to claim 1, 2, 3, 4, 14 [and] or 15, wherein said semiconductor device is [applied to] an EL display device.